Earth known as a "footprint." The size of this footprint is determined by the angular field of view of each pixel and the altitude of the sensor (Fig.3). A detector at a high altitude will see a larger area than one at a low altitude; however, a low flying sensor will generally have better resolution.

There are two basic types of sensors — "staring" and "scanning" (Fig. 4). In a staring sensor, a square or rectangular Focal Plane Array (FPA) continuously looks at a particular area and watches for changes in the incoming infrared radiation over time. The benefit of this technique is that an area is under constant watch, and depending on how often the electronics read out the incident photon energy on the FPA, it is possible to detect small, quick changes in incident radiation intensities. The drawback is that this kind of focal plane generally needs to be large in order to cover a significant area, and these large arrays are more expensive and difficult to build than smaller arrays.

A second technique is to use a smaller array and scan across a region to build a picture of the entire scene. Some common scanning detector methods include the side-to-side toggle scanner, the line scanner or "pushbroom" and the spin scanner or "spinner." The advantage of the scanning sensor is that the FPAs can be manufactured relatively inexpensively compared to large staring sensors while still providing the necessary coverage. The drawback is that as the FPA performs its scanning, it cannot watch an entire

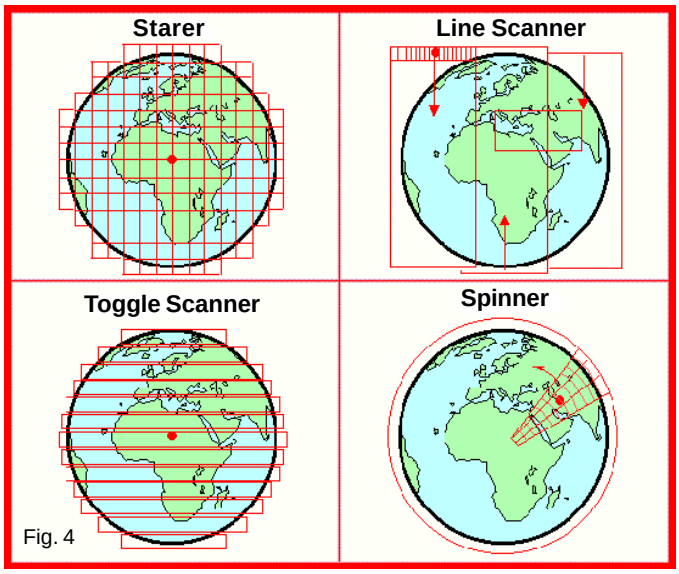

Fig. 4

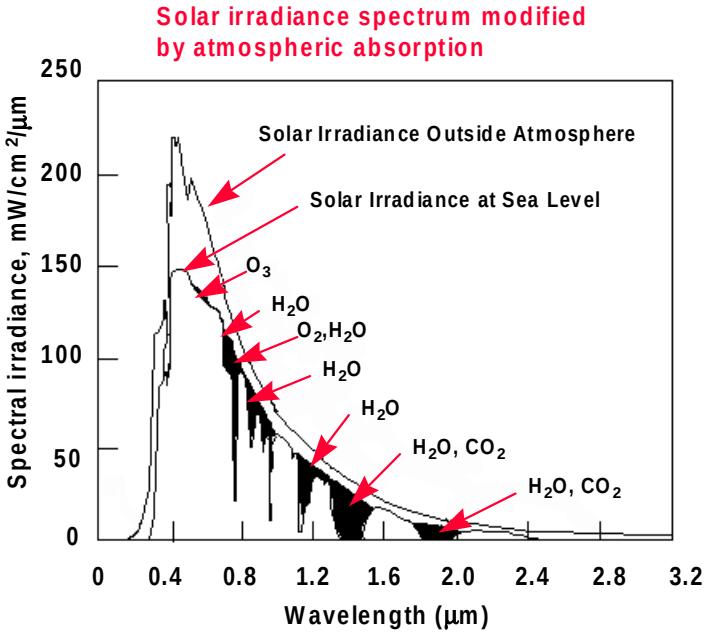

Fig. 5: This graph shows how atmospheric molecules can effect the infrared radiation received by a sensor.

scene simultaneously and might miss a change in an event occurring outside its immediate scan area. The speed at which a scanning sensor returns to a particular spot in the field of view is called "revisit rate." If the revisit rate can be made fast enough, a scanning sensor provides a practical alternative to a staring sensor.

The ultimate decision for which type of sensor to use depends on many factors including satellite configuration, mission, altitude and performance requirements.

Infrared sensors are "passive" devices, which means they do not send out and receive signals as do "active" sensors, such as laser or radar sensors. Instead, they passively wait until infrared energy from an object strikes the detector and is measured.

A space based infrared system allows each sensor to view a large area due to its high altitude; however, because satellites are so far away, the infrared radiation needs to travel a great distance in order to reach it, which reduces the amount of radiation received at the detector. In addition, the atmosphere absorbs some infrared radiation at particular wavelengths, thus reducing the amount of radiation reaching the detector even more (Fig. 5). To overcome these factors, space based infrared detectors are designed to be very sensitive. Also,